

Mainly about Construction

BY "MEGOHM"

CHARGING THE 112-VOLT ACCUMULATOR

AN A BATTERY CHARGER CAN BE USED

This is a small device that can be added to the 112-volt B accumulator in this column. Its addition does not entail any removing of tubes or plates in the case of a battery already constructed and in working order. The device is a very efficient and reliable switching arrangement whereby the battery can be charged by any A battery charger giving a voltage of about 20 or 24. The object is to do away with the use of a chemical rectifier, and utilise the quicker and more reliable double-wave valve charger, of which a number of good makes are available. This will encourage constructors and listeners to get the one charger, and let it be a good one; and one that will answer for both batteries. It should also be mentioned here that this attachment can be used in connection with any type of B battery, and has been applied to a bought battery of three units with uninterrupted success. The idea has been in use for a long period, has stood the test of time, and can be recommended.

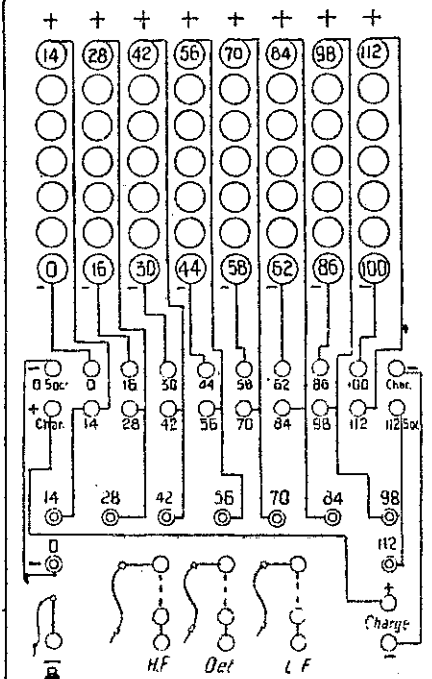
The principle made use of is that of charging in parallel and discharging in series, the change from one connection to the other being made by the lifting of the "series" connector, and substitution of the "parallel" or charging connector. In order to give absolutely reliable contact that need never go wrong, small mercury cups are used, and the construction of these as directed will be quite a simple matter. These cups, twenty in number, are placed through two rows of holes drilled in a piece of $\frac{1}{4}$ in. ebonite $6\frac{1}{2} \times 1\frac{1}{2}$ inches, and which takes the place of the flat strip of wood above the front panel of the battery.

Wiring Diagram.

As the wiring diagram is now ready, it will be explained first, and should be compared with the original diagram published. At the top is shown the battery of tubes, with a lead coming from the front and back tube of each row. A difference is now to be noted, for whereas a branch was originally taken from each positive tap to connect to the front end of the next row of tubes, this short connection is now to be taken away, leaving the negatives unconnected. A wire from the corresponding mercury cup will later be soldered to the tag projecting above these negative plates.

The two rows of mercury cups are shown below the tubes, the back row all negative and the front row all positive. The positive end of each tube row is already connected to the tapping sockets on front panel, and these sockets must now also be connected to the correspondingly numbered mercury cup in the front row. It should be noted that

all cups except the two end ones of each row are connected to the respective positive and negative ends of rows of tubes. An extra charging terminal is now placed above the one already supplied. The left-hand cups are connected to C socket and positive charging terminal and right-hand pair to 112-volt socket and negative charging terminal. The charger can be left permanently connected to these, as there is provision



in the connectors that only closes the circuit from the cups when charging is arranged for. In order to allow more room for connections behind the top of the front panel, it should be put down to the bottom of the side pieces when replacing, and the inch space at top filled up with a strip of wood. A narrow strip can be screwed on bottom end of side pieces, front flush with bottom edge of panel, and holes drilled to take plugs when not in use.

The Mercury Cup Panel.

This, as already mentioned, is a piece of $\frac{1}{4}$ in. ebonite $6\frac{1}{2} \times 1\frac{1}{2}$ inches. Next week a full size template of this will be given so that positions of holes to be drilled can be punched through the paper direct upon the ebonite.

Space does not permit of the description being completed in this issue, so it will be concluded next week.

ANSWERS TO CORRESPONDENTS

"Megohm" has had a number of appreciative letters from readers who have obtained improved reception by carrying out hints given in answer to inquiries. It is always interesting to hear the result of suggestions that have been made, and those readers who have taken the trouble to write in and report are thanked accordingly.

Chemical Rectifier Tips.

An Auckland reader writes an appreciation of the test-tube type of B battery, having had a 72-volt in use for a long time, charging with a chemical rectifier. He recommends the covering of the upper half of the aluminium electrode with rubber tape, tightly bound on to exclude all chemical action, and also serving the purpose of reducing the area of plate surface. This is an idea that is frequently used in chemical rectifiers, and is easily tried. Its chief object is to prevent corrosion of the aluminium near the surface of the liquid. When charging a test-tube battery in series the current required is very small, so that it is always safe to keep the size of electrodes down, and also to keep them as far apart as possible. One inch has been stated as the minimum distance apart.

Loop Aerials.

W.D. (Helsville).—Presumably you require a loop for experiment. It will only give about one-sixth the volume of your good outside aerial. A loop for broadcast reception should contain about 70 feet of wire, preferably not finer than 18's, spaced a little over one-eighth inch apart. Two feet for each side would be suitable, and could have ten turns of wire. Make a cross with three arms equal and one longer to go in a stand. Drill a hole near end of each arm and put short dowels through. Notch dowels for wires. Shellac the whole frame before putting the wire on.

Estimating Wave-length on Dials.

C.F.B. (Alexandra).—The whistles you hear around 29 and 30 degrees on your wave-length dial are probably the carrier waves of 2UB, 297 metres, 250 watts, Sydney; or 2KY, 280 metres, 1500 watts, Sydney. You should be able to get these stations easily on favourable nights with your five-valve Browning-Drake, and both wet batteries. Probably it is only experience in tuning-in that you lack, and this will soon be acquired with practice. It is difficult to give the range of the set without some idea as to its efficiency or the name of maker. It should be able to reach nearly 10,000 miles on odd favourable occasions if it is in effi-

cient order. The four-valve Browning-Drake just described in this column for constructors, has reached WBBM (Chicago), 7000 miles; KFKX (Hastings, Nebraska), 6500 miles; three Japanese stations, 5000 miles, and a good number of American Pacific coast stations. Familiarity with positions of known stations on the dials enables one to estimate approximately the wave-length of a newly-found station from its relative position to the nearest known station on either side. But there is a method by which a given wave-length may be found on the dial to a degree. Take a piece of graph paper and along the bottom mark off 200 at the left, 300 two inches to the right, 400 and 500 each two inches apart to represent metres. Every tenth of an inch will equal five metres. Now up the side we want the degrees, usually up to 100, commencing at 0 at the bottom. At every half-inch mark 10, 20, 30, up to the total number on dial. Now tune in all the stations you can, one by one, and with a list of wave-lengths, place a dot on the graph to represent each station, the position being found by reckoning the degrees on dial upwards and number of metres wave-length reckoned across. Where these two readings intersect a dot is placed. When a dozen or so stations have been marked, well spaced across the graph, the dots are joined by a line running through each, which will probably give a slightly curved line running diagonally upwards to the right. The line can be extended in the same direction at either end for a short distance to the edge of graph. Now, suppose you wish to find a station you know to be transmitting on 350 metres, look for 350 on the graph, and following this line upwards until the curved line is met, the point of contact gives the number of degrees at which that particular wave-length may be found. Of course a little searching a degree or two on either side may have to be done, and the other dial must be brought into resonance in the usual way. The degree readings may be taken from the resonance or secondary tuner, because that one is the least likely to be altered. Any alteration in the arrangement of the circuit may upset the accuracy of the graph and necessitate making another. The graph will also show the approximate wave-length of a station when the dial reading has been obtained.

An interesting letter has been received from an enthusiast in the Feilding district, but is rather lengthy to deal with at present.

Crystal Improvement.

"Inquirer" (Stratford) wishes to know how to increase volume on an inexpensive crystal set he has constructed, and which receives 2YA, 1YA, and 3YA, the two last-named faintly. Your diagram shows a slider tuning arrangement, which is quite a good method. Wire on coil should be 20's or 22's gauge, space wound. Look to earth connection, which is important. Possibly a galena crystal would give better results than the hertzite now in use. (2) The single pole double throw switch in the aerial circuit does not take the place of an arrester, which must be provided in addition.

Crystal Amplification.

C.H.W. (Wellington) asks for particulars of resistance-coupled amplifier to add to crystal set. Resistance coupling of the usual type cannot be used immediately after a crystal detector, as the principle depends upon the anode potential of a preceding valve. Transformer coupling is the most satisfactory for crystal amplification, and if good components are used, very fine results are obtained with one or two stages. There is a circuit known as the Sharnan circuit that utilises capacity coupling between crystal and valve on an unusual principle, and is said to give good results on long-distance work.

B Accumulator.

"Radio" (Auckland).—The holes in battery plates should be kept small, about one-sixteenth inch or a shade larger only, so that the paste will not tend to come through. (2) About forty holes in each should be sufficient. (3) If new paste is used, lead peroxide is

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THE BEST BY TEST

THE OSCILLATING CRYSTAL

AS A HIGH-FREQUENCY AMPLIFIER

Oscillating crystals have not been much experimented with by amateurs, owing, no doubt, to the ease with which a valve circuit can be put together to replace the crystal. There is, however, much scope for interesting and useful experiment in the direction of increasing the sensitivity, and thus the range, of a crystal detector. Experiments already conducted have shown surprising results in comparison with those obtained with the ordinary crystal circuit. As an H.F. amplifier as much as 15 to 1 amplification has been obtained, but as an I.F. amplifier an increase of volume about 3 to 1 is all that may be expected.

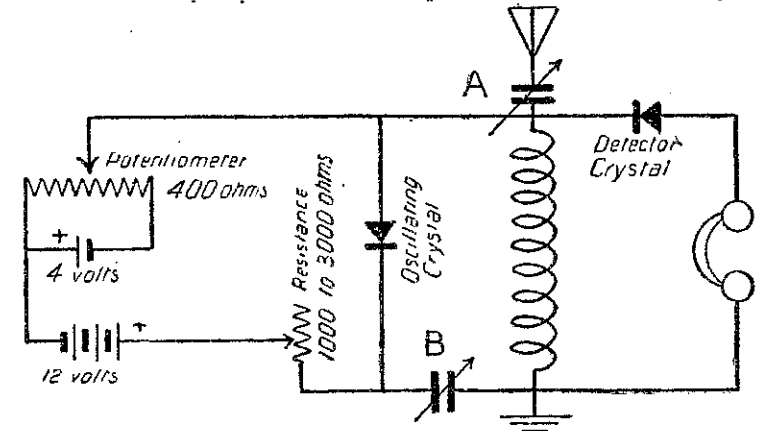
The oscillating circuit can be added to an ordinary crystal set. The extra components required will be a variable condenser, capacity according to the one already in use, 400 ohm potentiometer, resistance, 4-volt and 12-volt flash-lamp battery, and a good specimen of zincite crystal. The potentiometer must be a smooth-working one, as any break will throw the crystal off oscillation. The resistance may be a fixed one of about 2000 ohms, and for this purpose the secondary winding of an I.F. transformer may be used. A variable resistance can be used with some advantage.

Zincite is the only crystal used to

used is one ear-piece winding of a 4000 ohm pair of 'phones. It should be noted that the zincite is connected to the positive end of the battery. For the detector a perikon combination is particularly suited, but any stable crystal of high resistance can be used, but one of low resistance, such as hertzite, would be liable to cause howling. Condenser A .0005, condenser B .00035.

Operation.

The method of operation is somewhat as follows: The cat's-whisker is taken off the zincite and a station tuned in on the detector crystal, condenser B, at zero. Condenser B is then turned to full capacity, whilst the surface of the zincite is explored for a sensitive spot, the potentiometer being set about half-way over, and cat's-whisker contact light. When oscillation is obtained a rushing sound will be heard in the 'phones, and a moist finger placed on the aerial terminal will give clicks. The oscillation must be allowed to steady down before tuning is proceeded with. Care must be taken not to jar the set in any way. The condenser B is then turned until the whistle of a carrier wave is heard, and tuning is carried out with the two condensers and potentiometer, and, provided that the tuning coil is of suitable value, reception should be satisfactory. A lit-



give oscillations, and of this a good specimen must be obtained. A suitable sample has a deep, dull-red, glassy appearance, and if not this colour all over, there must be a very substantial patch of it, or trying to obtain oscillation will be a mere waste of time. A crystal having the appearance of a piece of coke will be useless. Zincite is a somewhat brittle crystal, and on that account should not be too tightly clamped in the cup. The usual cat's-whisker must be replaced by a spiral of No. 30 steel wire, or a copper spiral with an ordinary pin at the end. The point of cat's-whisker must not be too sharp, and may be blunted slightly on glass-paper. The oscillator should rest upon a piece of felt or spongy rubber, in order to deaden all outside mechanical vibration, as this is an important factor towards success. The resistance already mentioned must not on any account be less than 1000 ohms, as it must exceed the resistance of the cat's-whisker contact, which is usually 800 to 850 ohms. Another trial resistance that may be

the practice will be required to regulate the battery potential, so that oscillations are just ceasing when the carrier wave is tuned in.

Improving the Crystal.

A good specimen of zincite will give oscillations, but it can be improved by the process of fusing in an electric arc in contact with manganese dioxide. An amateur may carry out the equivalent of this process on an ordinary fire by placing the crystal in a tin lid with a little manganese dioxide. Place this in a hot fire until the crystal shows a white heat, when it may be taken from the fire and allowed to cool gradually.

The above notes have been compiled from several reliable sources, and are given at the request of a number of readers who wish to experiment in this direction, but the circuit has not been personally tested. "Megohm" will be glad to hear from anybody who gets good results, which will probably not be very difficult to obtain.

Neutrodyne Troubles.

"Earth Wire" (Balclutha).—If your five-valve neutrodyne squeals as you state, it is probably not properly neutralised. Carry out instructions given on neutralisation in last instalment of Browning-Drake article in No. 10 of the "Record." The usual midge variable condenser should be quite suitable for a neutraliser in your set. If after neutralising you are still troubled with squealing, try reducing plate voltage on R.F. valves, and if this does not effect a cure, try a slight reduction on these filaments.

Crackling Noises in Set.

N.H.M. (North Otago).—You can test audio transformer windings for continuity with 'phones and a "dud" dry cell giving about a volt. If these are O.K., then the trouble is elsewhere. Replace the suspected condenser, and see there are no loose connections. Make sure the crackle is not from B battery. If it is more than one of these matters, the best course would be, under the circumstances, to send it to the distributors for overhaul, as they suggest.

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